

# WARFARE CENTERS

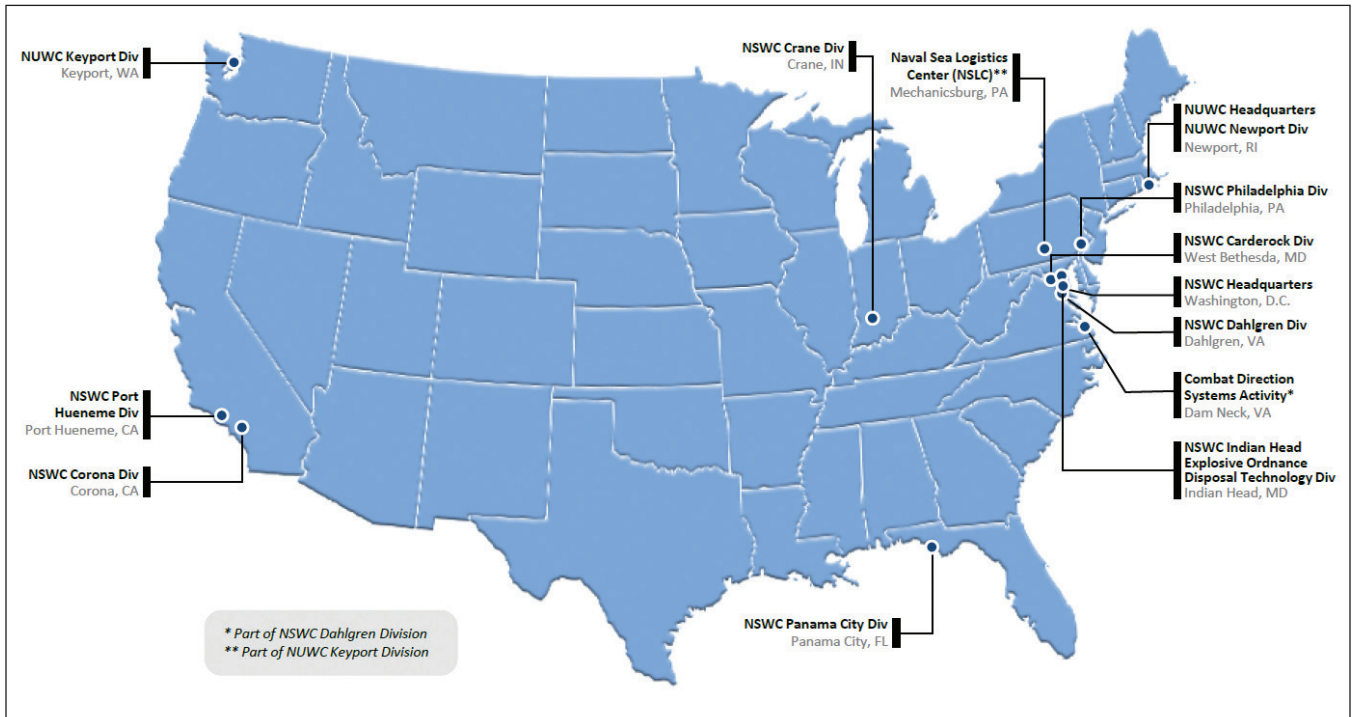


Figure 5-1. Naval Sea Systems Command Naval Surface Warfare Centers Map

Naval Sea Systems Command (NAVSEA) exists to make Naval (Navy and Marine Corps) programs successful. The vision of NAVSEA is to be the Navy's trusted partner for identifying and providing innovative cost-effective technical solutions to the warfighter. NAVSEA is responsive to the Naval enterprises, the Joint Force and national requirements, while partnering with industry, other DoD laboratories, and academia. Within NAVSEA, support for the warfighter is accomplished at both the Naval Surface Warfare Center (NSWC) and the Naval Undersea Warfare Center (NUWC).

The mission of the NSWC is to operate the Navy's full-spectrum research, development, test and evaluation, engineering, and fleet support centers for ship systems, surface ship combat, and weapons systems, littoral warfare

systems, force warfare systems, as well as other offensive and defensive systems associated with surface warfare and related areas of joint, homeland and national defense systems from sea and ashore. NSWC also provides the Navy's core technical capability for the integration of weapons, combat and ship systems into surface ships and vehicles, and for development and integration of energetic materials for joint applications.

The mission of NUWC is to operate the Navy's full-spectrum research, development, test, and evaluation, engineering, and fleet support center for submarines, autonomous underwater systems, and offensive and defensive weapons systems associated with undersea warfare and related areas of homeland security and national defense. NUWC also provides the Navy's core technical capability for the integration

of weapons, combat and ship systems into submarines and undersea vehicles.

The Warfare Centers view the Marine Corps as an important strategic partner. To facilitate a productive relationship with the Marine Corps, the Warfare Center Division Technical Directors chartered the NAVSEA Warfare Center USMC Collaboration Team (CT). The vision for the CT is to work seamlessly across the Warfare Centers Divisions to support and advocate for technically superior and cost-effective solutions for the Marine Corps. The CT is a readily available resource to facilitate Marine Corps stakeholder engagement with the Warfare Center Divisions.

The following NSWC Division Fact Sheets highlight each warfare center's capabilities and focus on capabilities relevant to the Marine Corps.

## NSWC Carderock Division (NSWCCD)

### Mission

Provide research, development, test and evaluation, analysis, acquisition support, in-service engineering, logistics and integration of surface and undersea vehicles and associated systems. Develop and apply science and technology associated with naval architecture and marine engineering, and provide support to the maritime industry. Execute other responsibilities as assigned by the Commander, Naval Surface Warfare Center.

### Description

The Carderock Division consists of approximately 2,000 scientists, engineers and support personnel working in more than 40 disciplines ranging from fundamental science to applied/in-service engineering. We are the Navy's experts for maritime technology. The Division houses world-class facilities and laboratories. Carderock's Headquarters is located in West Bethesda, Maryland. The Division also conducts research and development at several remote sites across the country.

### Technical Capabilities

- CD03 Advanced Naval Capability (Marine Corps Vehicles) Concepts and Technology
- CD05 Combatant Craft and Expeditionary Vehicles
- CD07 Hull Forms and Fluid Dynamics
- CD14 Surface, Undersea, and Weapon Vehicle Materials
- CD15 Surface and Undersea Vehicle Structures
- CD16 Alternative Energy and Power Sources R&D
- CD17 Liquid Waste Management,

### Science and Systems

- CD18 Solid Waste and Hazardous Material Management, Science and Systems, and Ships and Subs Systems Safety
- CD20 Surface, Undersea and Expeditionary Vehicle Vulnerability Reduction and Protection

### Facilities

- Acoustic Research Detachment
- Advanced Ceramics Laboratory
- Biotechnology Laboratories
- Center for Innovation in Ship Development
- Circulating Water Channel
- Combatant Craft Department
- David Taylor Model Basin
- Deep Submergence Pressure Tank Facility
- Dosimetry Laboratories
- Electrochemical/Battery Laboratories
- Environmental Protection Laboratories
- Explosives Test Pond
- Fatigue and Fracture Laboratories
- Fire Tolerant Materials Laboratories
- IR Systems
- Large Cavitation Channel (LCC)
- Large Scale Grillage Test Facility
- Magnetic Fields Laboratory
- Magnetic Materials Laboratory
- Maneuvering and Seakeeping Basin (MASK)
- Manufacturing Technology Laboratory
- Marine Coatings Laboratories
- Marine Corrosion Control and Evaluation Laboratories
- Marine Organic Composites Laboratories
- Materials Characterization and Analysis Laboratory
- Metal Spray Forming Laboratory
- Nondestructive Evaluation (NDE) Laboratories

- Radar Imaging Modeling System (RIMS)
- Rotating Arm Facility
- Ship Materials Technology Center
- Shock Trials Instrumentation
- Signature Materials Laboratories
- Small Gas Turbine Test Facility
- South Florida Testing Facility
- Southeast Alaska Acoustic Measurement Facility (SEAFAC)
- Structural Dynamics Laboratory
- Structural Evaluation Laboratory
- Subsonic Wind Tunnel
- Survivability Engineering Facility
- Welding Process and Consumable Development Laboratories

### **Current Marine Corps Support Areas**

- USMC Platform/Vehicle Hydrodynamics and Hydromechanics
- USMC Platform/Vehicle Integration and Design
- Survivability
- Structures
- Materials
- Power/Energy
- Environmental Quality and System Safety

### **Current Marine Corps Programs Supported**

#### **PEO Land Systems**

##### AAA

- AAV Hydrodynamics
- AAV R7 BOOM AND CRANE ASSEMBLIES Corrosion
- ACV 1.0/2.0 Hydrodynamics
- ACV Human Factors

##### MRAP

- Live Fire Testing and Evaluation (LFT&E)/Survivability

### **Joint Non-Lethal Program Office**

- Polymer Kelp Program (Small Boats/Craft)

### **MCSC**

- SBIR Program Manager
- Corrosion Prevention and Control (CPAC Program)
- Expeditionary Power

### **USMC Headquarters Expeditionary Energy Office (E20)**

- Power/Energy

### **MCOTEA**

- Integrated JLTV Live Fire Test & Evaluation Activities

### **Joint Program Executive Office Chemical and Biological Defense - JPM Protection (JPM P)**

- Joint Service Aircrew Mask (JSAM) Strategic Aircraft (SA) Wind Tunnel testing for the XM69 respirator

### **USMC Headquarters Marine Corps, Installation and Logistics**

- Additive Manufacturing Demonstrations

### **USMC Science and Technology (S&T) Efforts**

- Extended Operational Reach of Expeditionary Forces using Wireless Charging for Battery Operated Unmanned Aircraft
- Quad-Ski Assessment and Familiarity
- Quad-Ski Detection and Signature Evaluation
- Quantifying the Impact of Surf Zone Characteristics on Vessel Dynamics
- Unmanned Swarming Amphibious Assault Vehicle
- Hybrid Structures for Amphibious Vehicles

- Development Study and Prototyping of All-Solid-State Mediator Supercapacitor
- Advanced Topcoat System – Ground Vehicles
- BEYOND LI-ION Hybrid Energy Storage
- Repeatability Study on Additive Manufacturing Systems
- Underwater Wireless Energy Transfer (UnWET)
- Failure Analysis of lithium batteries

## Pictures

Depicts autonomous recharging of an Unmanned Aircraft



## Advanced Expeditionary Power and Energy



## USMC Hybrid Expeditionary Power/Energy



## USMC Survivability



## USMC Hydrodynamics



## USMC Corrosion Prevention & Control (CPAC) & Materials Support





## NSWC Corona Division

### Mission

NSWC Corona provides the Navy and Marine Corps independent analysis and assessment with 1400 scientists, engineers, and support staff, and more than 1800 contractors.

The mission of NSWC Corona is to “Serve warfighters and program managers as the Navy’s independent assessment agent throughout systems’ lifecycles by gauging the Navy’s and Marine Corps’ warfighting capability of weapons and integrated combat systems, from unit to force level, through assessment of those systems’ performance, readiness, quality, supportability, and the adequacy of training.”

### Technical Capabilities

- AC01 Warfare Systems Performance Assessment
- AC02 Quality and Mission Assurance Assessment
- AC03 Metrology, Test, and Monitoring Systems Assessment
- AC04 Naval Surface & Air Range Systems Engineering
- AC05 Weapons Systems Interface Assessment
- AC06 Naval Systems Material Readiness Assessment
- AC07 Strategic Systems Testing and Analysis, and Surveillance Assessment
- AC08 Ground Combat Weapons and Ammunition Test, Evaluation, and Assessment

### Facilities

NSWC Corona is home to three premier national laboratory and assessment centers: Joint Warfare Assessment Lab (JWAL); Measurement Science and Technology Lab (MSTL); and Daugherty Memorial Assessment

Center (DMAC). Along with the “Corona Engineers,” these state-of-the-art facilities enable Corona to fulfill its unique mission for the Navy. The JWAL and DMAC are at the core of Corona’s integrated approach to warfare assessment, and the MSTL is where Corona researches and establishes the metrology and calibration standards for the procedures for the Navy and Marine Corps. NSWC Corona’s Fallbrook Detachment is strategically positioned next to Marine Corps Base Camp Pendleton, providing integrated Test and Evaluation (T&E) support to the fleet.

Using a rigorous, disciplined independent assessment process, Corona provides the fleet, program managers, and acquisition community with the objective assessment needed for the Navy and Marine Corps to gauge warfighting capability of ships, aircraft, and ground systems; assess warfare training; and analyze new defense systems – even those systems in the concept phase.

### Current Marine Corps Programs Supported

#### PEO Land Systems

##### AC2SN

- Marine Air-Ground Task Force (MAGTF) Common Aviation Command and Control Systems (CAC2S) Analysis and Assessment
- Composite Tracking Network (CTN) Analysis and Assessment

##### GBAD/GATOR

- G/ATOR Test, Analysis and Assessment Support

#### PEO-EIS

##### PM GCSS-MC

- Business Intelligence Information Technology support
- Data Analytics and Readiness Assessment
- Information Assurance

- Configuration Management

## MCSC

### *PfM LCES, PM Ammunition*

- Total Life-Cycle Assessment
- In-Service Engineering Agent
- T&E for Operational Reliability, Service Life, and Surveillance
- Technical Agent for Fleet Malfunction Investigations
- Global Inventory Supply Chain Management and Pre-Positioning
- Knowledge and Information Management
- Joint Services Production Engineering Assessments
- T&E for Javelin and Tube-launched Optically-tracked Wire-guided (TOW) Missiles

### *PfM LCES, PM SUP/MAINT Systems*

- Test Measurement and Diagnostic Equipment (TMDE) Maintenance
- Automated Test and Equipment Program (ATEP) Calibration
- Metrology and Calibration (METCAL) Engineering
- Infantry Weapons Gage Calibration Program (IWGCP) Maintenance

### *PfM Supporting Establishment Systems*

- Emergency Response System (ERS) Development and Maintenance
- Public Safety Network (PSNet) Engineering
- Secure Operational Network Infrastructure and Communications (SONIC) Analysis

### *PfM GCES, PM Infantry Weapons*

- Test and Evaluation Support

### *PfM CES, PM C2 Systems*

- Joint Battle Command Platform (JBC-P) T&E
- MAGTF Common Handheld (MCH) T&E

## PM TRASYS

- Training Assessment Program Development
- Tactical Warfare Simulation Certification and Accreditation (C&A)
- Tactical Training Ranges (TTR) Development and Maintenance
- Virtual Battlespace Two (VBS2) C&A

## AVTB

- Test Instrumentation and Data Collection

## SEAL

- Global Positioning System (GPS) Liaison
- ALPS
- Item Unique Identification (IUID) Engineering

## MCICOM

- Logistical Utilities Management and Energy Systems Development
- Advanced Metering Infrastructure (AMI) C&A
- Industrial Control Systems (ICS) Assessment

### *MCB Camp Pendleton Environmental Security Division*

- Geographic Information Systems (GIS)
- Knowledge and Information Management and Accreditation
- SharePoint Support

## MCOTEA

- Amphibious Combat Vehicle V1.1
- Joint Light Tactical Vehicle

## NSWC Crane Division

### Mission

Provide acquisition engineering, in-service engineering and technical support for sensors, electronics, electronic warfare and special warfare weapons. Apply component and system-level product and industrial engineering to surface sensors, strategic systems, special warfare devices and electronic warfare/information operations systems. Execute other responsibilities as assigned by the Commander, Naval Surface Warfare Center.

### Description

Naval Surface Warfare Center, Crane Division, (NSWC Crane) is a shore command of the U.S. Navy, under the Naval Sea Systems Command headquartered in Washington, DC. It is a business-based enterprise operating under the Navy Working Capital Fund. Sixty-Seven percent of the workforce is made up of scientists, engineers, and technicians.

NSWC Crane Headquarters is located in southwestern Indiana and is a tenant on the third largest Navy installation in the world. With nearly 100 square miles of land, no encroachment, strong state and local support, and a cost of living index 22.7 percent below the U.S. national average, Crane is indispensable to the nation as a high-value provider of innovative solutions and services.

Multi-service partnerships with Crane Army Ammunition Activity and Army/Indiana National Guard's Camp Atterbury Joint Maneuver Training Center, Muscatatuck Urban Training Center (MUTC), and Hawthorne Army Depot in Nevada strengthen Crane's ability to rapidly assess new technologies immersed in an operational-type environment with electronic attack clearance and restricted air space.

In 2013, NSWC Crane realigned our technical capabilities, thus increasing our military value

assessment while integrating our adjacent technology products and narratives. NSWC Crane specializes in sensors, electronics, electronic warfare, and special warfare weapons. Our primary mission focus areas are Special Missions, Strategic Missions, and Electronic Warfare/Information Operations. In support of these Mission Focus Areas, Crane's scientists, engineers, and professional workforce provide stewardship and high-military value knowledge, contracts, hardware, and software across the following Technical Capabilities with support from the Business Capabilities.

### Technical Capabilities

- CR04: Electronic Warfare Systems RDT&E/Acquisition/Life Cycle Support
- CR10: Infrared Countermeasures and Pyrotechnic RDT&E and Life Cycle Support
- CR15: Strategic Systems Hardware
- CR16: Special Warfare and Expeditionary Systems Hardware
- CR18: Advanced Electronics & Energy Systems
- CR19: Sensors and Surveillance Systems

### Current Marine Corps Programs Supported

#### PEO Land Systems

*PM-Air Command and Control and Sensor Netting (AC2SN)*

- Common Aviation Command and Control System (CAC2S)
- Marine Air Command and Control System (MACCS)
- Composite Tracking Network (CTN)

*PM-Ground Based Air Defense (GBAD) and Ground/Air Task Oriented Radar (GBAD & G/ATOR)*

- G/ATOR
- Advanced Man-Portable Air



## Defense System (AMANPADS)

- Counter-Unmanned Aerial Systems (C-UAS)

## PM-Light Tactical Vehicles (LTV - Legacy)

- HMMWV
- ITV
- UTV

## PM M&HTV

- MTRV
- MATV

## MCSC

### PfM CES, PM-Intelligence Systems

- Ground Based Operational Surveillance System (G-BOSS)
- USMC Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW)
- Topographic Production Capabilities (TPC)
- Target Material Production (TMP)
- Tactical SIGINT Collection System (TCSC)
- Technical Control and Analysis Center (TCAC)
- Intelligence Broadcast Receiver (IBR)

### PfM CES, PM-Radars

- AN/TPS-59 and AN/TPS-63 Long Range Radars

### PfM GCES, PM-Fires (IW)

- Anti Armor Systems (TOW, Javelin, SMAW, SABER)

### PfM GCES, PM-Infantry Weapons

- PM-IWS Procurements, Engineering and Testing (M13 Mod7 Sniper Rifle, MK 125 Tripod, .50 Cal Poly Case Ammo, etc.)
- Optics and Non-Lethal Systems (AN/PVS-15, AN-PAS13G)

## PfM LCES, PM-Engineering Systems

- Mk-154 Land Mine Clearance
- TMDE Systems

## PfM LCES, PM-Ammunition

- Ammunition Programs and Inventory Management

## NSWC Crane S&T efforts demonstrated during the NSWC Crane 2017 Innovation & Sensor Fusion Experimentation Advanced Naval Technology Exercise (ANTX)

### Silent ATV



A High-Speed Side-by-Side (SxS) All-Terrain Vehicle (ATV) with a reduced noise signature to enable our

### Drone Defeater/DRAKE



Drone Defeater is capable of defeating the radio frequency (RF) links on small unmanned aircraft systems (UAS). Drone Defeater uses currently-fielded CREW systems and a counter UAS (C-UAS) threat load to non-kinetically defeat UAS.

### Drone Integrated Acquisition Tracker



The Drone Integrated Acquisition Tracker (DIAT) is capable of detecting and tracking small unmanned aircraft systems (UAS). The

system monitors common frequencies the UAS uses to transmit video. Using an array of antennas the received signal strength can be measured and compared in order to acquire a line of bearing and track the UAS. The video feed from the UAS can also be intercepted and recorded. The system is controlled remotely by a nearby mobile device connected via Bluetooth.

### MPDC (C-UAS)



The MPDC, is an enhanced Information System which boasts a significantly smaller footprint than the standard PED systems currently employed by the DoD. This offers the warfighter a man portable, deployable solution, in a space saving design, with the ruggedness needed on today's battlefield, capable of supporting a wide portfolio of intelligence software applications, in support of various intelligence arenas (i.e. GEOINT, COMINT, SIGINT). software applications, in support of various intelligence arenas (i.e. GEOINT, COMINT, SIGINT).

### MESA RADAR



The Echodyne MESA active metamaterial array is scalable allowing for modularity in the implementation of an array, this allows for multiple integration platforms to be leveraged to create a sensor network capable of detecting Group 1 UAS platforms and providing situational awareness to the critical points of the kill-chain.

### Small Arms System Controller (SASCON)

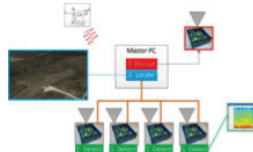
The Small Arms System Controller (SASCON), will consist of a newly developed Slew-to-Cue Interface Pack (SCIP) that will take tracking data from a CCFLIR EO and accurately slew



the MK49 GWS to simulate acquiring contact on an incoming aerial threat. This will be followed by a kinetic kill capability by firing live rounds.

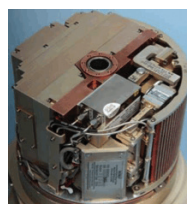
### Counter UAS Surrogate

The Counter UAS Surrogate is a distributed



network of IQ Processor RF sensors which find the location of RF emitters using TDOA based algorithms. The RF sensors, the IQ Processor, is a Government developed Firmware Defined Radio utilizing Ettus Research RF Daughter Cards and a Government designed mother board with an Altera FPGA and Analog Devices Digital Signal Processor card. The network is currently run over fiber optic cables with a growth path towards RF control links in 2017. This is named "surrogate" because the system is not intended to be fielded but to provide lessons learned to other program of record systems using TDOA or other tracking algorithms.

### Common Core Radar (CCR) Patriot



The Common Core Radar (CCR) is an automated range finder, Ka-band radar; which is a pulsed radar system; intended to provide an automated, all-weather detection, range finding and relative speed sensor to detect targets on the horizon on/or at low elevation angles (.100 above the horizon). CCR has a Low Probability of Intercept (LPI), which has been proven at prior operational experiments. Control and display of the CCR functions are accomplished via an Ethernet connection from the radar to a laptop and returns are displayed on a PPI GUI. CCR is light weight, can run off of 115 VAC, is deployable worldwide.

## NSWC Dahlgren Division (NSWCDD)

### Mission

Provide research, development, test and evaluation, analysis, systems engineering, integration and certification of complex naval warfare systems related to surface warfare, strategic systems, combat and weapons systems associated with surface warfare. Provide system integration and certification for weapons, combat systems and warfare systems. Execute other responsibilities as assigned by the Commander, Naval Surface Warfare Center.

### Description

Through the years, Dahlgren established itself as the major testing area for naval guns and ammunition. Today, it continues to provide the military with testing and certification by utilizing its Potomac River Test Range in Dahlgren, VA, and provides Fleet support at Combat Direction Systems Activity in Dam Neck, overlooking the Virginia Capes Fleet Operations Area, Virginia Beach, VA.

NSWCDD conducts basic research in all systems-related areas and pursues scientific disciplines including physics, mathematics, laser and computer technology, software, mechanical, electrical and systems engineering, and biotechnology and chemistry.

### Technical Departments

- Strategic and Computing Systems (A)
- Electromagnetic & Sensor Systems (B)
- Gun & Electric Weapon Systems (E)
- Weapons Control & Integration (H)
- Readiness & Training Systems (R)
- Warfare Systems Engineering & Integration (V)
- Mission Engineering & Analysis Directorate (ME)

### Facilities

NSWCDD occupies four geographic locations, the Naval Observatory in DC and Dahlgren, Wallops Island, and Dam Neck in Virginia. The NSWCDD Headquarters at Dahlgren is near Quantico and the Pentagon. The Dam Neck facility is near Marine Corps Forces Command in Norfolk. NSWCDD includes several unique national facilities including the Littoral Operational Area Range and the Potomac River Test Range. NSWCDD operates state-of-the-art facilities supporting all assigned technical areas such as: sensors, unmanned systems, fire control systems, integrated warfare systems, directed energy, railgun, chem-bio defense, and electromagnetic environmental effects.

### Current Marine Corps Support Areas

- Vehicle 3-D Modeling and Laser Scanning drawing development, configuration management and sustainment
- Vehicle Capability Insertions design, integration, fielding and sustainment
- Expeditionary Command and Control design, integration, and testing
- Energy Modeling, Analysis, and Testing
- Expeditionary Analysis, Modeling and Simulation
- Human Systems Integration
- Safety Engineering
- Directed Energy Weapons
- Advanced Sensor Development
- Autonomous and Unmanned System Development
- Chem-Bio Sensors and Defense Development
- Guns and Ammunition T&E

### Current Marine Corps Programs Supported

#### CD&I

- Engineering Support to Seabasing Integration Division

## MCWL

- Engineering Support

## PEO Land Systems

### AAA

- AAV Emergency Egress Lighting
- AAV Electrical Upgrade
- AAV ARVCOP (Funded by PMS 495)
- Habitability

### AC2SN

- CAC2S Software Integration and Management
- CAC2S Test & Evaluation

### M&HTV

- LVSR 3-D Modeling
- MTRV 3-D Modeling
- Vehicle Capabilities Insertions

### GBAD-G/ATOR

- G/ATOR Engineering and Acquisition

## MCSC

### PfM CES

- Combat Operations Center (COC) Engineering
- Joint Battlespace Viewer sustainment
- E3 Hazards Engineering
- Composite Tracking Network (CTN)

### PfM LCES, PM-Ammo

- 40mm Ammunition
- Anti-Personnel Obstacle Breaching System (APOBS)
- 120mm Ammunition, Missiles & Rockets

### PfM GCES, PM-Infantry Weapons (IW)

- Raids and Recon Depot Support

- Anti-Armor
- M40A5 Rifle Improvement Project

### PfM GCES, PM-Fires

- Ordnance Qualification
- Weapon System Integration
- Improved Positioning and Azimuth Determining System (IPADS)
- Ground Weapon Radar Support

### PM-Light Armored Vehicle (LAV)

- Anti-Tank Modernization

### SEAL

- Systems Engineering
- Energy
- CIED
- Expeditionary M&S and FACT Support

## USMC Science and Technology (S&T) Efforts

- Autonomous Littoral Connectors
- Azimuth and Inertial Measurement
- Ground Based Air Defense (GBAD) Vehicle Integration
- Modular Explosive Hazard Defeat System (MEHDS)
- Joint Infantry Company Prototype (JIC-P)
- Enhanced Expeditionary Engagement Capability (E3C)



## **NSWC Indian Head Explosive Ordnance Disposal Technology Division (IHEODTD)**

### **Mission**

Provide research, development, engineering, manufacturing, test, evaluation and in-service support of energetic systems and energetic materials (chemicals, propellants and explosives) for ordnance, warheads, propulsion systems, pyrotechnic devices, fuzing, electronic devices, Cartridge Actuated Devices and Propellant Actuated Devices (CAD/PADs), Packaging, Handling, Storage, and Transportation (PHS&T), gun systems and special weapons for Navy, Joint Forces and the Nation. Develop and deliver Explosive Ordnance Disposal (EOD) technology, knowledge, tools and equipment and their life-cycle support through an expeditionary work force, which meets the needs of the DoD, combatant commanders and our foreign and interagency partners. Support the Executive Manager for EOD Technology and Training. Execute other responsibilities as assigned by the Commander, Naval Surface Warfare Center.

### **Description**

The NSWC Indian Head Explosive Ordnance Disposal Technology Division (NSWC IHEODTD) located in Indian Head, MD brings together the largest full-spectrum energetics facility in the DoD with the largest concentration of explosive ordnance disposal technology resources and information in the world. The Division's unique synergy and balanced capabilities address all aspects of the energetics technical discipline, including basic research, applied technology, technology demonstration, prototyping, engineering development, acquisition, low-rate production, in-service engineering, weapons system integration, system safety, mishap & failure investigations, surveillance, EOD technology & information, and demilitarization.

### **Technical Capabilities**

- Threat and Countermeasure Information Development and Dissemination for EOD, IED, and CREW
- Technology Development and Integration for EOD, IED, and CREW
- EOD unmanned systems
- Energetic and Ordnance Component and Ordnance Systems for:
  - S&T
  - Air Warfare
  - Surface Warfare
  - Undersea Warfare
  - Expeditionary Warfare
  - Emergent & National Requirements.

### **Major Facilities**

- Aircrew Escape Ordnance Devices Development & Prototyping Complex
- Detonation Physics RDT&E and Acquisition
- Bombproofs, blast chambers, self-contained gun ranges
- Continuous Twin-Screw Processing R&D and Scale-up
- 20-mm, 37-mm, 40-mm and 88-mm extruders
- Novel Materials R&D
- Nano-energetic materials characterization
- Complete suite of analytical capabilities
- Cast Composite Rocket Motor and PBX R&D & Scale-Up Complex
- Ordnance Test Facilities
- Chemical, Physical Property and Metallurgy Labs
- Quality Evaluation (QE)/Surveillance Facility
- Specialty Energetic Chemical Scale-up Facility
- High Pressure Explosives, Physics & Combustion Lab



- Bomb testing; Strand burning; Combustion instability testing
- MEMS Clean Room, Underwater Warheads RDT&E and Modeling & Simulation
- Foreign Ordnance Electronics Exploitation Laboratory
- Magnetic Signature Test Facility
- Ordnance Disassembly Complex
- Hypervelocity Test Facility
- Oxygen Cleaning Laboratory
- EOD Diver Complex

## **Current Marine Corps Programs Supported**

### **PEO Land Systems**

#### *AAA*

- PdM Amphibious Assault Vehicle (AAV) - Engineering and Sustainment

#### *LTV*

- PM LTV - System Safety
- PdM JLTV - Engineering and Risk Management

#### *M&HTV*

- PdM MTRV - System Safety
- PdM LVSR - Logistics Support

#### *GBAD-G/ATOR*

- GBAD System Safety
- G/ATOR System Safety

#### *AC2SN*

- AC2SN System Safety

### **MCSC**

#### *PfM LCES, PM Ammo*

- Multi Point Initiator (MPI)
- MK22 Mod 4 Rocket Motor Insensitive Munitions (IM)

- MICLIC Arresting Cable Release Mechanism (ACRM)
- ACRM System Safety
- PM AMMO Principal for Safety
- TOW and Javelin Engineering Services

#### *PfM LCES, PM Engineer Systems*

- Explosive Ordnance Disposal (EOD)
- MK154 Electrical Systems:
- Design Review and Production

#### *PfM GCES, PM Fires*

- Team Tanks - Systems Safety
- Team Anti-Armor Systems - Engineering Services

#### *PfM-CES, PM C2 Systems*

- COC - Test and Evaluation/ Software Support

#### *PfM-CES, PM Intelligence*

- Electronic Warfare Systems - System Safety

#### *Systems Engineering and Acquisition Logistics (SEAL)*

- Command Safety - Safety Support
- Autocell - Engineering Services

### **Joint Non-Lethal Program Office**

- Indirect Fire Munition Engineering/ Technical Support
- BAA & Contract

## NSWC Panama City Division

### Mission

Conduct research, development, test, evaluation and in-service support of mine warfare systems, mines, naval special warfare systems, diving and life-support systems, amphibious/expeditionary maneuver warfare systems, and other missions that occur primarily in coastal (littoral) regions. Execute other responsibilities as assigned by Commander, Naval Surface Warfare Center.

### NSWC PCD Technical Capabilities

- PC20-Chemical and Biological Warfare Individual Protection Systems
- PC21-Expeditionary Coastal and Maritime Security System Engineering and Integration
- PC25-Air Cushion Vehicle Systems
- PC26-Expeditionary Maneuver Warfare Systems Engineering and Integration
- PC27-Special Warfare Maritime Mobility Mission Systems and Mission Support Equipment
- PC28-MCM Detect and Engage Systems, Modular Mission Packaging, and Platform Integration and Handling
- PC29-Littoral Mission Systems Integration and Modular Mission Packages Certification
- PC30-Unmanned Systems Engineering and Integration, Autonomous Operations, Joint Interoperability and Common Control
- PC31-Mine Sensor and Target Detection Technology, Mine Delivery Platform Integration, and Minefield Architecture
- PC33-Diving and Life Support Systems
- PC34-Surface Life Support Systems for Extreme Environments

### Description

NSWC PCD performs Research Development

Test and Evaluation to include Science and Technology development across the full spectrum of Littoral warfare systems and operations. The warfare center technical expertise in expeditionary warfare encompasses afloat and shore based C4; expeditionary systems to ship interfaces; assault breaching systems; land mine and obstacle countermeasures to include technologies to detect and neutralize a broad spectrum of explosive hazards in environments extending from the surf zone to the objective; targeting sensors; seabasing systems; and Ship-to-objective maneuver systems.

### Facilities

Located on 650 acres, NSWC PCD operates state-of-the-art facilities supporting all assigned mission areas such as: LCAC Repair and Maintenance Facility, Air Operations, Sea Fighter (FSF-1), and the Littoral Warfare Systems Facility. The Gulf Coast is an ideal location for Expeditionary Operations and Testing; NSWC PCD manages the water space for the Joint Gulf Test Range (JGTR), which includes Eglin ranges and spans the Gulf of Mexico, bays, estuaries, rivers and harbors. As part of the JGTR, we perform amphibious operations and have developed an Expeditionary Maneuver Test Range for vehicle testing. NSWC PCD also has state of the art acoustic and magnetic test facilities, including a non-magnetic test area to support sensor development efforts that doubles as a laser test range.

### Current Marine Corps Support Areas

- Combat Engineer Route Reconnaissance and Clearance (R2C) and Mobility/Counter-Mobility design, integration, testing, fielding, and sustainment
- Vehicle 3-D Modeling and Laser Scanning drawing development, configuration management and sustainment
- Vehicle Capability Insertions design, integration, fielding and sustainment
- Expeditionary Command and

Control design, integration, testing, fielding, and sustainment

- Energy Modeling and Analysis and Testing
- Expeditionary Analysis, Modeling, and Simulation
- S&T development of advanced technologies for explosive hazard detection and defeat, counter tactical surveillance and targeting, and autonomy to support operations across the spectrum of combat environments.

## Current Marine Corps Programs Supported

### PEO Land Systems

#### AAA

- AAV Emergency Egress Lighting
- AAV Electrical Upgrade
- AAV Survivability Upgrade
- AAV ARVCOP (Funded by PMS 495)



#### M&HTV

- LVSR 3-D Modeling
- MTRV 3-D Modeling
- Cougar Configuration Management

### MCSC

#### PM-Command and Control Systems

- Lead Systems Integrator, Design Agent, In-Service Engineering Agent for Expeditionary Command and Control System
- Joint Battlespace Viewer sustainment

#### PM-Engineer Systems

- NSWC PCD is the Technical Agent (TDA, ISEA, AEA, and SSA) for systems of the USMC Engineering Systems Route Reconnaissance and Clearance and Mobility/ Counter-Mobility missions.

- CSE Enhanced Tray Ration Heating Sink System engineering and testing support
- Thermostat Evaluation



#### SEAL

- Expeditionary M&S and FACT Support

### CD&I

- FMID - JLTV Transportability Analysis

### ONR

- Advanced 3d (A3D) ladar for the detection of threat systems
- Pre-shot sniper detection radar
- Low Average Power, High Voltage Energy (LP-HVE)
- Modular Mine Spoofing System (MMSS)
- VSW-SZ EHD Concepts for MEUs
- Advanced Volumetric Processing for Ground Penetrating Synthetic Aperture Radar
- Standoff Interferometric Target Detection and Excitation
- Advanced Land and Anti-Helicopter Mine EHD
- Autonomous Assault Amphibious Vehicle (A-AAV)
- Tactical Vehicle A3D Integration
- LOCUST Integration

### NISE

- Mission-ready Autonomous AAV

## NSWC Port Hueneme Division

### Mission

Provide test and evaluation, systems engineering, integrated logistics support, in-service engineering and integration of surface ship weapons, combat systems and warfare systems. Provide the leading interface to the surface force for in-service maintenance and engineering support provided by the Warfare Centers. Execute other responsibilities as assigned by the Commander, Naval Surface Warfare Center.

### Description

Naval Surface Warfare Center, Port Hueneme Division (NSWC PHD) maintains technical expertise at locations across the United States: Engineering and Logistics at Port Hueneme, CA; Search Radar Engineering at Virginia Beach, VA; and Live Fire Testing at White Sands, NM.

Port Hueneme Division is recognized as the Navy's Center of Excellence for In-Service Engineering, Test and Evaluation, and Integrated Logistics Support for surface warfare combat and weapon systems. Since its inception in 1963, Port Hueneme Division has been supporting the combat and weapon systems of the Fleet by providing highly skilled personnel and state-of-the-art facilities to lead the development and support of Navy surface ship warfare systems throughout their life cycles.

Port Hueneme Division focuses its technical capabilities on direct connectivity to the Fleet on a global basis and the immediate availability of around-the-clock access to products, services, and Fleet support capabilities. Capabilities will support predictive system failure, remote diagnostics, and corrective action via real-time, networked communications.

Port Hueneme Division capabilities include "Cradle to Grave" lifecycle engineering and sustainment planning to ensure that combat, weapon, radars, air and surface surveillance systems work effectively together to accomplish ship, Strike Group, and Theater Warfare assigned missions throughout their life. Naval Enterprise area assignments include: Surface, Aviation, Expeditionary Combat, NETWAR/FORCENet, and Undersea for over 50 major acquisition programs. In addition, NSWC PHD provides overland live fire testing of Naval weapons in support of weapons systems acquisition (missiles and laser systems), assembly of weapons for overland and at sea live-fire testing, launch of research rockets, and assembly/launch of low- and medium-fidelity theater ballistic targets.

### Technical Capabilities

Provide In-Service Engineering (ISE), Test & Evaluation (T&E), and Integrated Logistics Support (ILS).

- PH01 Strike Force Interoperability and Theater Warfare Systems
- PH02 Surface and Expeditionary Combat Systems
- PH03 Surface and Expeditionary Weapon Systems
- PH04 Underway Replenishment Systems
- PH07 Surface and Expeditionary Missile Launcher Systems
- PH08 Radar Systems
- PH09 Directed Energy Systems
- PH10 Littoral Mission Module
- PH11 Ballistic Missile Defense T&E Specialized Target Vehicle Development, Integration and Deployment

### Marine Corps Support Areas

- Test & Evaluation (T&E), Integrated Logistic Support (ILS), and In-Service Engineering (ISE)

- Enterprise Product Life Cycle Management Integrated Decision Environment (ePLM IDE), Sustainment and Product Support modeling and analytics/end-to-end product data management

## **Current Marine Corps Programs Supported**

### **PEO Land Systems**

#### AAA

- Amphibious Assault Vehicle (AAV) Family of Systems (FoS) ePLM IDE product data configuration management implementation

#### AC2SN

- Composite Tracking Network (CTN) T&E, M&S, ILS & ISE support

#### GBAD-G/ATOR

- G/ATOR T&E, Production Monitoring, Program Management, Contracting Officers Representation, Reliability Maintainability and Availability (RM&A) Engineering, ILS Support

### **MCSC**

#### PfM GCES, PM-Fires

- AN/TPS-59 and AN/TPS-63 Long Range Radars T&E, Systems Engineering, CM support
- AN/TPQ-49 Lightweight Counter Mortar Radar Sustainability Study, In-Service Review for USMC Primary Inventory Control Activity (PICA), Diminishing Manufacturing Sources and Material Shortages (DMSMS) analysis

#### SEAL

- In-Service Engineering (ISE), Guidebook development & Training



## **SPAWAR Systems Center (SSC) Atlantic – SSC**

Atlantic Strategic Guidance-Work together as a high performing organization delivering timely capabilities at the right cost. Rapidly provide information warfare capabilities that exceed expectations.

### **Land Systems Integration (LSI) Mission**

Provide design, engineering, prototyping, and full scale integration of C4ISR capabilities into tactical ground vehicle platforms. Improve USMC readiness through the integration of mission equipment on vehicle platforms. Provide fielding, post-production, and sustainment support.

### **SSC Atlantic LSI Technical Capabilities**

Rapid integration and fielding of new capability into tactical vehicle platforms.

Complete System engineering data management approach. The Amphibious Combat Vehicle (ACV) and Assault Amphibious Vehicle (AAV) program offices invested in a suite of tools and SSC Atlantic LSI has integrated them into a systems engineering tool set. The tool set includes the following applications and their supporting function:

- System Architect-Enterprise Architecture (DoDAF)
- Rational DOORS & DOORS Next Gen-Requirements Development, Requirements Management, Requirements Traceability, and Requirements Verification/Validation Reporting
- Rational Team Concert-Configuration Mgmt., Risk Mgmt., Task Mgmt., Defect Mgmt., etc
- Rational Quality Management-Manage Test: Process, Plans, Cases, Scripts
- Rational Asset Management-

Enterprise Class Data Storage for COTS/GOTS applications

- Open Services for Lifecycle Collaboration (OSLC) Integration -Link to other non-IBM applications (PTC Windchill-Product Lifecycle Management, supporting Technical Data Packages)
- Open Technical Data Package (TDP) development utilizing a wide range of technology from 3D scanning, 3D modeling, and 3D printing, as well as expanding their capabilities in the realm of mechanical and electrical simulation.

Software and Hardware Tool Set:

- 2D & 3D Modeling, Scanning and Simulation Software
- AutoCAD Professional
- SolidWorks Professional (2013-2016)
- SolidWorks Electrical (2013-2016)
- PTC Creo 3.0
- GEO MAGIC DESIGN X
- ANSYS Mechanical
- ANSYS HFSS
- 3D modeling and scanning hardware

Rapid and dynamic MAGTF test environment architecture engineering.

Radio Frequency (RF) test and analysis capabilities with the equipment, facilities, personnel, and expertise to ensure RF capable systems are compatible with other subsystems and its host platform.

Shock and Vibration test and analysis capabilities.

Proactive collaborative teams utilizing Government Quality Assurance Processes and Procedures utilized.

### **Facilities**

24,000 square foot Digital Integration Facility (DIF) is reconfigurable to support multiple

concurrent platform systems design and testing.

100,000 square foot Vehicle Integration Facility provides the capability for production scale C4ISR integration. Configured to rapidly customize vehicular platforms with mission equipment.

40,000 square foot Swing Space Facility is a secure government Test & Evaluation (T&E) laboratory. This space offers the capability to connect to various secure Government networks in coordination with other DoD C4ISR projects.

## **Marine Corps Logistics Command**

### **➤ MRAP**

## **USMC Programs Supported**

### **PEO - Land Systems**

- Advanced Amphibious Assault (AAA)-AAV SW sustainment/3-D Modeling/COMMS upgrade
- Amphibious Combat Vehicle
- Light Tactical Vehicles (LTV)  
-Joint Light Tactical Vehicle /GB-GRAM-M integration and testing
- Medium and Heavy Tactical Vehicles (M&HTV)-LVSR & MTVR Integration/MRAP Integration

### **MCSC**

- Light Armored Vehicle (LAV) -Win 10 Fielding/C2 SW Sustainment/JBC-P/117-G
- MAGTF Command, Control, and Communications (MC3)-Networking On-The-Move (NOTM) into MRAP/M-ATV/KC-130/HMMWV
- Digital Fires Situational Awareness (DFSAs)- Mobile Tactical Shelter (MTS)
- Force Protection Systems- CVRJ Support
- Expeditionary Power Systems
- Engineering Systems-Route Reconnaissance & Clearance